

REMARKS

Claims 1-30 were examined. Claims 1-4, 10, 12, 14, 17, 19 and 26-27 are amended. Claims 16 and 20 are cancelled. Claims 1-15 and 17-19 and 21-30 remain in the application.

The Patent Office objects to the drawings under 37 C.F.R. §1.121(d). The Patent Office objects to the Abstract of the Disclosure. The Patent Office rejects claims 1-30 under 35 U.S.C. §102 or 103. Reconsideration of the Application and the pending claims is respectfully requested in view of the above amendments and the following remarks.

A. DRAWINGS

The Patent Office objects to the drawings under 37 C.F.R. §1.121(d). Specifically, the Patent Office requests hatching on all sectional views. Applicant submits replacement sheets showing Figures 4-5, 6-7, 8, 10, 11(d), 14(a) and 14(b), 15(a) and 15(b), 16(a)-16(c), 17(a), 17(b) and 18. The replacement sheets show hatching where appropriate as required by the Patent Office. Applicant respectfully requests the Patent Office enter the replacement sheets and withdraw the objection to the drawings under 37 C.F.R. §1.121(d).

B. OBJECTION TO ABSTRACT

The Patent Office objects to the Abstract of the Disclosure. Applicant submits herewith on a separate sheet an Abstract of the Disclosure. Applicant respectfully requests that the Patent Office enter the Abstract of the Disclosure and withdraw the objection.

C. 35 U.S.C. §102(b): Rejection of Claims 1-3, 10 & 17-20.

The Patent Office rejects claims 1-3, 10 and 17-20 under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 6,282,094 of Lo (Lo). Lo describes a BGA integrated circuit package with an unembedded-type of heat-dissipation structure. Lo describes thermally-conductive layer 34 interconnecting thermally-conductive solder balls 318 extending from back surface 311 of substrate 31. Solder balls 318 are connected to thermally-conductive vias 316 through substrate 31. Vias 316 are separate from electrically-conductive traces 312 and 313.

In manufacture, it is to be noted that the thickness of the thermally-conductive layer 34 should be lower than the height of the thermally-conductive solder balls 318; otherwise, when BGA IC package is mounted on a printed circuit board (PCB) through the surface-mount technology (SMT), it would make the thermally-conductive layer 34 come into contact with the electrically-conductive traces on the PCB, thus undesirably resulting in short-circuits or degradation to the heat-dissipation efficiency. Moreover, the thermally-conductive layer 334 should not be overly extended so as to come into contact with the nearby electrically-conductive solder balls 317 and the second electrically-conductive traces 313, otherwise, short-circuits would be resulted.

Column 4, lines 25-38. Lo teaches a material for thermally-conductive layer 34 of a mixture of metal and epoxy-based solder or an alloy of lead and tin (Pb/Sn).

Independent claim 1 is not anticipated by Lo, because Lo does not describe a stress relief layer on a first side of a package substrate in contacting a plurality of electrical contact formations. As noted above, Lo keeps thermally-conductive layer 34 away from contact with electrically-conductive traces or interconnects.

Claims 2-3 depend from claim 1 and therefore contain all the limitations in that claim. For at least the reasons stay with respect to claim 1, claims 2-3 are not anticipated by Lo.

Independent claim 10 is not anticipated by Lo, because Lo does not describe an electronic assembly including a stress relief layer on a package substrate in contact with a plurality of electrical contact formations. In this regard, the comments made above regarding Lo in claim 1 are relevant.

Independent claim 17 is not anticipated by Lo, because Lo does not describe a method of constructing an electronic assembly including depositing a stress relief layer on a side of a package substrate, the side having a plurality of electrical contact formations thereon such that the stress relief layer comes in contact with the plurality of electrical contact formations. As noted above, Lo keeps its thermally-conductive layer 34 away from the electrically conductive traces and interconnects.

Claims 18-20 depend from claim 17 and therefore contain all the limitations of that claim. For the reason stated with respect to claim 17, claims 18-20 are not anticipated by Lo.

Applicant respectfully requests that the Patent Office withdraw the rejection to claims 1-3, 10 and 17-20 under 35 U.S.C. §102(b).

D. 35 U.S.C. §103(a): Rejection of claim 4.

The Patent Office rejects claim 4 under 35 U.S.C. §103(a) as obvious over Lo in view of U.S. Patent No. 6,160,224 of Ogashiwa (Ogashiwa). Ogashiwa is cited for making solder bumps of a particular height.

Claim 1 is not obvious over cited the references, because the cited references do not describe an electronic assembly including a stress relief layer contacting a plurality of electrical contact formations. Ogashiwa does not remedy the deficiencies of Lo. Applicant respectfully requests the Patent Office withdraw the rejection to claim 4 under 35 U.S.C. §103(a).

E. 35 U.S.C. §103(a): Rejection of claims 5-8

The Patent Office rejects claims 5-8 under 35 U.S.C. §103(a) as obvious over Lo in view of Ogashiwa and further in view of U.S. Application 2002/0179289 of Yamashita (Yamashita). Yamashita is cited for teaching using a thermally-conductive thermal plastic adhesive resin to draw heat away from a heat producing device. Yamashita and Ogashiwa are also cited for teaching an air space between a stress relief layer and a circuit board.

Claims 5-8 depend from claim 1 and therefore contain all the limitations of that claim. For at least the reasons stated with respect claim 1, claims 5-8 are not obvious over the cited references. Combining Yamashita and Ogashiwa with Lo does not teach or provide a motivation for an electronic assembly having a stress relief layer contacting a plurality of electrical contact formations. Applicant respectfully requests that the Patent Office withdraw the rejections claims 5-8 under 35 U.S.C. §103(a).

F. 35 U.S.C. §103(a): Rejection of Claim 9

The Patent Office rejects claim 9 under 35 U.S.C. §103(a) as obvious over Lo in view of Ogashiwa, in further view Yamashita and further view U.S. Patent No.

6,219,241 of Jones (Jones). Jones is cited for teaching a microelectronic dye that is a microprocessor.

Claim 9 depends from claim 1 and therefore contains all the limitation of that claim. For at least the reason stated with respect to claim 1, claim 9 is not obvious over the cited references. The references fail to teach or provide any motivation for contacting a plurality of electrical contact formations with a stress relief layer. Applicant respectfully requests the Patent Office withdraw the rejection to claim 9 under 35 U.S.C. §103(a).

G. 35 U.S.C. §103(a): Rejection of claims 11-12 & 14-16

The Patent Office rejects claims 11-12 and 14-16 under 35 U.S.C. §103(a) as obvious over Lo in view of Jones. Claims 11-12 depend from claim 10 and therefore contain all the limitations of that claim. For at least the reasons stated with respect to claim 10, claims 11-12 are not obvious over the cited references. The references fail to teach or provide any motivation for a stress relief layer in contact with a plurality of electrical contact formations.

Independent Claim 14 describes an electronic assembly including a stress relief layer between a package substrate and a circuit board and in contact with a plurality of electrical connections on the package substrate. As noted above with respect to claim 1, Lo (the primary reference) teaches thermally-conductive layers 34 away from electrical traces and interconnects. Jones does not cure this defect. Claim 15 depends from claim 14 and contains all the limitations of that claim. For the reasons stated with respect to claim 14, claim 15 is not obvious over the cited references. Applicant respectfully request that the Patent Office withdraw the rejection to claims 14-15 under 35 U.S.C. §103(a).

G. 35 U.S.C. §103(a): Rejection of Claim 13

The Patent Office rejects claim 13 under 35 U.S.C. §103(a) as obvious over Lo in view of Jones and further in view of Yamashita. Claim 13 depends from claim 10 and therefore contains all the limitations of that claim. For the reasons stated with respect to claim 10, claim 13 is not obvious over the cited references. Applicant respectfully requests that the Patent Office withdraw the rejection to claim 13 under 35 U.S.C. §103(a).

H. 35 U.S.C. §103(a): Rejection of Claims 21-25

The Patent Office rejects claims 21-25 under 35 U.S.C. §103(a) as obvious over Lo in view of Yamashita. Claims 21-25 depend from claim 17 and therefore contain all the limitations of that claim. For at least the reasons stated with respect to claim 17, claims 21-25 are not obvious over the cited references. Applicant respectfully requests the Patent Office withdraw the rejection under 35 U.S.C. §103(a).

I. 35 U.S.C. §103(a): Rejection of Claims 27-30

The Patent Office rejects claims 27-30 under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,706,558 of Nakamura (Nakamura) in view of Lo. Nakamura is cited for teaching a method including placing a plurality of packages on a support. Lo is cited as described above for teaching a stress relief layer.

Claims 27-30 are not obvious over the cited references, because the references fail to describe a method including suspending a stencil over a plurality of semi-conductor packages, the stencil having a plurality of holes, and flowing a paste through the holes to form a stress-relief layer on a side a package substrate of semi conductor package in contact with a plurality of electrical contact formations. The Patent Office admits that the references do not disclose a stencil. The references also

fail to teach or provide any motivation for a stress relief layer in contact with electrical contact formations.

Applicant respectfully requests that the Patent Office withdraw the rejection to claims 27-30 under 35 U.S.C. §103(a).

J. Objection to Claim 26

The Patent Office objects to claim 26 but finds claim 26 allowable over the prior art of record. Applicant amends claim 26 to include the limitations of original claim 17. Applicant believes claim 26 in its current form is allowable. Applicant respectfully requests that the Patent Office withdraw the objection.

CONCULSION


Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

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